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Research Note INT-323
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Recovering Western Spruce Budworm Larvae from Sticky Traps Covered with Volcanic Ash[1]

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Recovering Western Spruce Budworm Larvae from Sticky Traps Covered with Volcanic Ash[1]

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ABSTRACT

Ash fallout from the May 18, 1980, eruption of Mount St. Helens in the State of Washington covered more than 460 sticky traps in western Montana forests. The traps were deployed to study dispersal of western spruce budworm larvae. A technique is decribed for removing the ash from the sticky trap surface and extracting and counting the larvae.

KEYWORDS: *Choristoneura occidentalis* Freeman, western spruce budworm, volcanic ash, larval dispersal, Mount St. Helens, trapping insects

INTRODUCTION

As part of current studies to measure (1) loss of Stage II western spruce budworm *(Choristoneura occidentalis* Freeman) larvae during dispersal, and (2) the relationship of dispersing larvae to the incidence of tree seedling establishment and development, we install traps to catch larvae in the forest before the onset of the spring dispersal period. At the end of the 8- to 10-week dispersal period, we collect the traps and return them to the laboratory for examination.

Our traps (fig.1) consist of a 24- by 18-inch (61-by 46-cm) piece of 3/8-inch (9.4-mm) plywood, covered with butcher paper, which is coated with a sticky substance (TACK TRAP[3]) that captures dispersing

[1]Work leading to this publication was wholly funded by a USDA Forest Service-sponsored program entitled, "Canada-United States Spruce Budworms Program."

[2]Biological technician and supervisory research entomologist, respectively, located at the Intermountain Station's Forestry Sciences Laboratory, Missoula, Mt.

[3]The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others that may be suitable.

Approved for publication by Intermountain Station September 1981

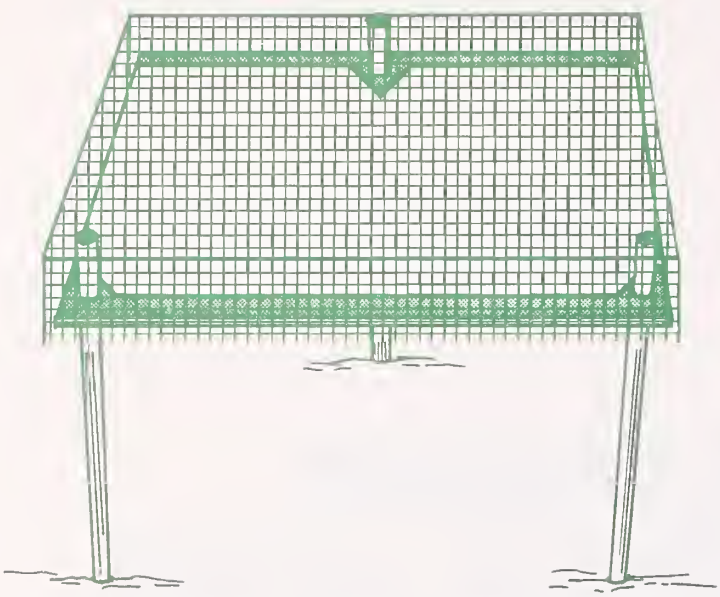

Figure 1.—Dispersal trap supported by three plastic stakes and covered with hardware cloth screen.

budworm larvae. The traps are supported 18 inches (46 cm) above the ground by three stakes and covered with a piece of 1/2-inch (1.25-cm) mesh hardware cloth to prevent birds and small mammals from sticking to the trap.

During late April 1980, we installed 467 of these traps at eight study areas in western Montana to study spring dispersal patterns of western spruce budworm larvae. These eight study areas are within a 70-mile (113-km) radius of Missoula, Mt.

On May 18, 1980, Mount St. Helens erupted, and over a 4-day period, from May 18 to 21, volcanic ash was deposited at varying depths within the fallout zone (National Geographic 1981). All of our eight study areas in western Montana were in a zone where ash accumulated to depths of from 0.062 to 1 inch (1.6 to 25.4 mm) (fig. 2). Presumably, that amount of ash also accumulated on our traps, scattered throughout the eight study areas. At the time of the ash fall, western spruce budworm larvae had been dispersing for approximately 4 weeks, and the dispersal period was peaking or had peaked at most of our study areas. (We determine

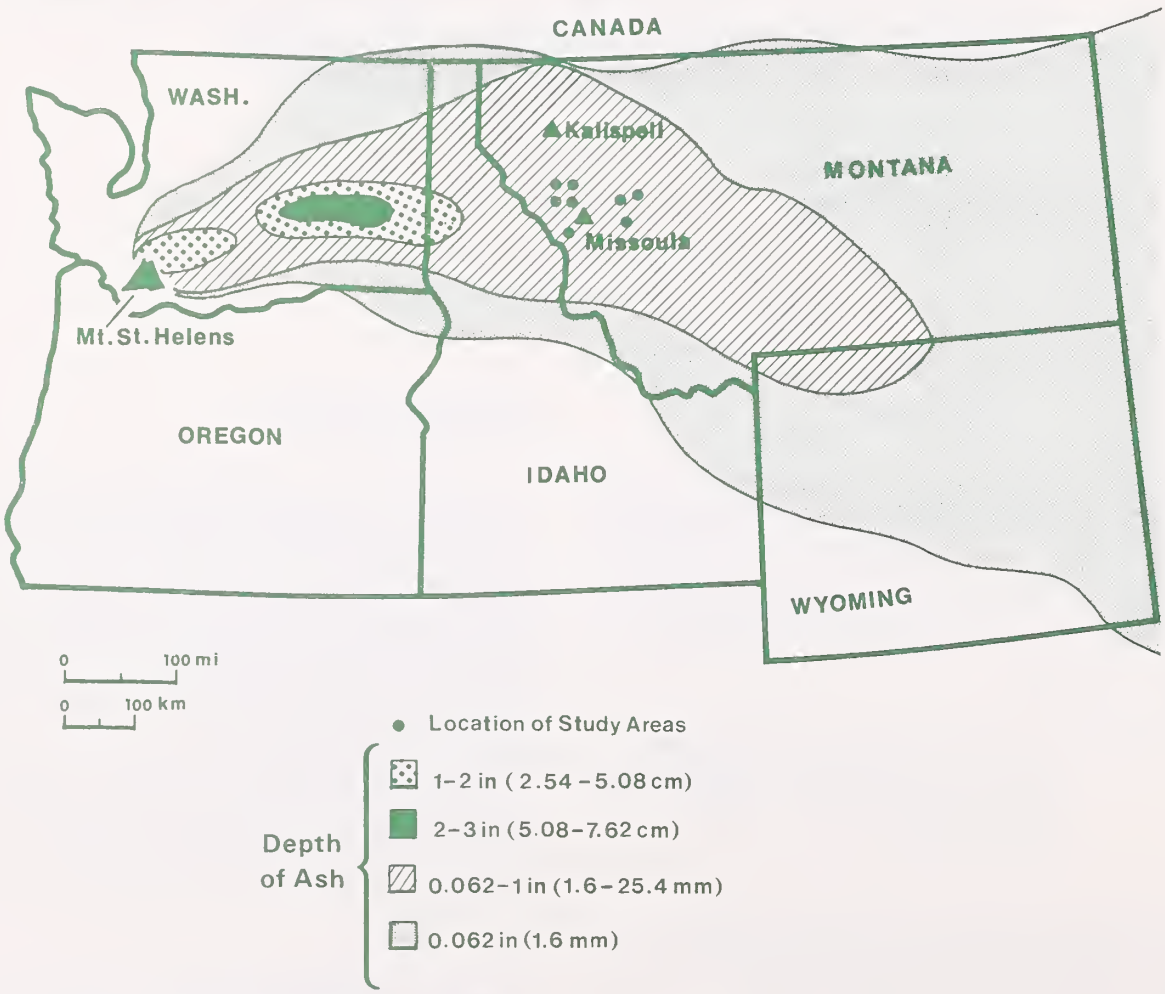

Figure 2.—The generalized pattern of ash fallout in the Pacific Northwest states from the 18 May 1980 eruption of Mount St. Helens (adapted from Moen and McLucas 1981), showing relative locations of eight areas where western spruce budworm larval dispersal studies were in progress during the ash fall.

the larval dispersal period each spring by weekly monitor trapping at four study sites.) Ash deposited on the sticky surface of the traps rendered them ineffective in capturing larvae throughout the remainder of the dispersal period.

After the ash fall abated, rain began falling in western Montana. In the 4-day period between May 22 and 26, 3.7 inches (9.4 cm) of rain fell in Missoula, Mt. (National Climatic Center 1980). Rainfall on May 22 and 23 alone, 1.69 inches (4.3 cm), equaled nearly 10 percent of Missoula's average annual precipitation (Potts 1980). We are not certain how much rain fell at our eight study areas. Because the heavy rains were general and widespread, however, and because most of our study areas are higher in elevation than Missoula, we presume that as much or more rain fell at our study areas as was measured at the National Weather Service station in Missoula.

In early June we collected the dispersal traps and returned them to the laboratory for examination. Our normal lab procedure consists of cutting the sticky paper into six equal rectangular 6- by 12-inch (15- by 30-cm) pieces, examining the pieces under a binocular microscope, and recording the number of larvae on each section. Although the rain may have washed some ash from the traps, or compacted the ash on the traps (Cook and others 1981), 1 to 2 mm of ash was retained on the sticky surface of the traps, making it impossible to see through the ash and visually examine and count budworm larvae in the usual manner. It was apparent that we needed a new trap examination procedure to determine the incidence of larval dispersal, at least up to the date of the ash fall.

METHODS

The manufacturer[4] of TACK TRAP recommends using a light petroleum solvent (paint thinner) to clean TACK TRAP from hands and tools. Based on this recommendation, and after a series of attempts at partially washing the traps in solvent to remove the ash, we developed the following procedure (fig. 3) to remove the ash, debris, and TACK TRAP from the traps, and to recover and count the western spruce budworm larvae.

1. The sticky-coated paper was cut in six 6- by 12-inch (15- by 30-cm) pieces to facilitate handling.

2. Each piece was dipped into a wide-mouthed 6-qt (5.7-liter) jar containing approximately 1 gal. (3.785 liters) of solvent, and gently agitated by hand in a vertical dipping motion until all of the TACK TRAP had dissolved and the ash, larvae, and debris had washed off.[5]

3. The contents of the container were passed through two 60- by 40- mesh brass screens. The screen openings measured 0.48 by 0.31 mm. The ash particles, which ranged in size from <0.1 to 80 microns,[6] passed through both screens. Most debris and Stage II western spruce budworm larvae, with an average body length and head capsule width of approximately 1.38 mm and 0.31 mm, respectively, were retained on the screen.

This two-screen filtering system assured that any larvae that might pass through the first screen would be recovered on the second screen. Early in the development of this procedure, we examined both the screens and the precipitate after the solution had been poured through the screens. We found that few larvae were being washed through the first screen onto the second, and that no larvae passed through the second screen.

After all six sections of a trap had been washed and the solution filtered, the filtrate was set aside for approximately 1/2 hour while the suspended ash settled out. The solvent was then decanted and reused. By recycling the solvent, we could process 10 to 12 traps before the solvent became too contaminated with fine ash and TACK TRAP residue and had to be discarded.

4. After an entire trap was processed, we removed the screens from the funnels, turned the screens upside down, and then, separately, backwashed them with a wash bottle containing solvent into one or more labeled petri dishes.

5. The screens and the material washed into the petri dishes were examined under a dissecting microscope, and all Stage II budworm larvae in the dishes and remaining on the screens were counted.

6. The number of larvae per trap were recorded on an appropriate data form.

DISCUSSION

The Mount St. Helens eruption created some real problems with our western spruce budworm larval dispersal studies. Nevertheless, the methods we have described for removing ash and larvae from our traps enabled us to salvage research data that appeared to be hopelessly lost, and allowed us to maintain the continuity of our studies.

Because the ash fell at the peak of larval dispersal, the larval counts from the traps do not reflect the incidence of larvae dispersing after the ash fall. From our weekly monitor trapping, which continued throughout the spring dispersal period, we know the percentage of the overwintering larvae that dispersed after the ash fall. We have adjusted the counts of larvae from the ash-covered traps by that amount.

The cost of the procedures we describe here was $2.84 per trap, compared with $2.64 per trap for our normal laboratory procedure for microscopically examining the

[4]Animal Repellents, Inc., Box 999, Griffin, GA 30224.

[5]The sticky-coated paper was washed in a well-ventilated area where smoking and open flames were prohibited, and other containers of solvent were properly sealed and stored.

[6]Personal communication with J. Moore, geologist, University of Montana, Missoula.

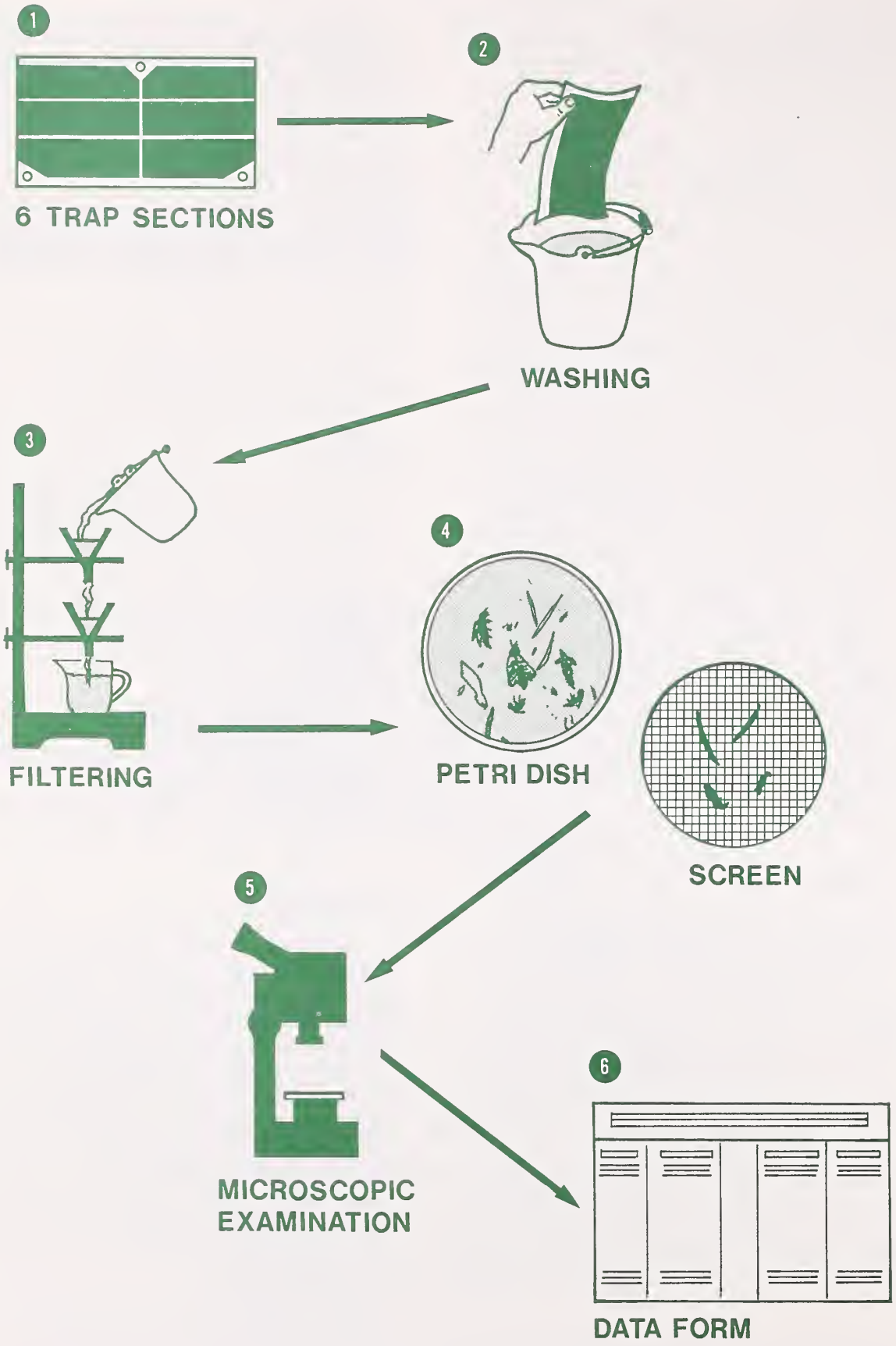

Figure 3.—Sequence for removing volcanic ash from sticky traps and recovering and counting western spruce budworm larvae.

dispersal traps. The $0.20-per-trap difference was for materials needed for the washing procedure. This is an insignificant difference when compared to the value of the research data which otherwise would have been lost.

We plan to continue using the washing procedure because it is useful on traps not covered with ash. The process will be used on traps where the sticky surface is covered with abnormal amounts of dust, debris, or other insects (particularly flies). Under these circumstances, many of the tiny Stage II larvae are hidden from the examiner's view and are not counted.

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